



Energized Electrical Work Review

Thomas Jefferson National Accelerator Facility

February 7-11, 2005

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Executive Summary

This review is the first of nine reviews of the Office of Science (SC) Laboratories that Dr. Raymond Orbach, Director (SC) requested be performed to provide an independent assessment of the planning and performance of energized electrical work (electrical hot work). The purpose of the review is to provide an overview of the status of work on energized electrical equipment across the SC Laboratory complex and to provide assistance to the SC Laboratories in the area of electrical safety. The review looked at the Laboratory systems and processes for handling work on energized electrical equipment.

This review was conducted at the Thomas Jefferson National Accelerator Facility (JLab) during the period February 7-11, 2005. Topics evaluated during the review were processes for working on energized equipment, implementation of those processes, training for laboratory and subcontractors who perform work on energized equipment, flowdown of Department of Energy (DOE)/JLab requirements to subcontractors, and contractor oversight methods.

JLab classifies work on electrical systems and equipment to be performed in three modes:

1. Mode 1 operations are those conducted with the equipment de-energized.
2. Mode 2 operations are measurements and troubleshooting with the equipment energized, normal protective barriers removed, and interlocks bypassed (diagnostics and testing).
3. Mode 3 are manipulative operations (installation or removal of circuit breakers, etc.) conducted with the equipment fully energized and with the normal protective barriers removed.

Mode 2 and Mode 3 work activities were the principal focus of this assessment.

On November 10, 2004, JLab management decided that Mode 3 work would require the Laboratory Director's approval. The Laboratory Director stated that he could not envision any reason for performing Mode 3 work at JLab. Since that time, JLab has been devoting efforts to implement the requirements of National Fire Protection Association (NFPA) Standard 70E *Standard for Electrical Safety in the Workplace*, 2004 edition (NFPA 70E). The SC Review Team believes that JLab is pursuing full implementation of NFPA 70E and recommends that the implementation be managed as a project to ensure that its implementation is scheduled, milestones are established, and progress is reported to Laboratory management. The document provided to the SC Review Team entitled, "NFPA 70E Implementation/SLAC Accident Investigation Review and Action Plan," should be included as part of the project.

The Interim Appendices of the Environment, Health & Safety Manual, which have been developed for control of Mode 2 and Mode 3 work, are being implemented and enforced at JLab. The Interim Appendices require an Associate Director's approval for Mode 2 work. The documentation of the approvals is through a work control document. Although the required hazard analysis calculations were being conducted, work control documents for Mode 2 work did not include the results of the hazard analysis calculations for required boundaries (approach and flash protection) and selection of Personal Protective Equipment (PPE). The SC Review Team recommends that the analysis and results be documented. The Interim Appendices also require that the work control documents for Mode 2 work and the Electrical Safety Work Permit for Mode 3 work include the necessary PPE for the task. The SC Review Team recognizes that these are interim procedures; however, the finalized documents need to be compliant with NFPA 70E. The SC Review Team recommends that the individuals, who are developing these procedures and policies receive formal NFPA 70E training as a prerequisite to developing these procedures and policies.

Personnel, who conduct work on energized electrical equipment, are required to be "qualified" to perform this work. JLab's current definition for a "qualified person" does not match the NFPA 70E requirements. JLab's currently available training related to electrical safety is limited to training courses for *EH&S Orientation*, *CPR & AED*, and *Lock, Tag and Try*. These courses do not cover all the aspects of the work performed. The SC Review Team recommends that Laboratory management make available a comprehensive set of required site training courses pertaining to the safe performance of energized electrical work by Laboratory and subcontractor employees. Training requirements for subcontractor employees have been established by the Subcontracting Officer's Technical Representative (SOTR). Since JLab has not yet established baseline requirements for a "qualified person," a regimen of skills and knowledge of hazards and controls necessary for the safe performance of energized electrical work remains to be instituted.

JLab has recently announced the appointment of an interim Environment, Health & Safety (EH&S) Director while they are conducting a search for a permanent EH&S Director. This position reports directly to the Laboratory Director. The interim EH&S Director has been playing an important role in implementing NFPA 70E. Prior to the appointment of an interim EH&S Director, oversight of this activity has been within the line organizations. The EH&S function reporting to the Directorate provides JLab management with an opportunity for oversight of work on energized equipment as well as other EH&S functions. The SC Review Team recommends that the new EH&S Director take ownership for JLab's full compliance with NFPA 70E to ensure accountability for its implementation.

The Work Smart Standards set for JLab includes NFPA 70E. The JLab's EH&S Manual is being updated to assure compliance with the standard. Subcontractors are required to develop safety plans which must adopt the Lab's EH&S Manual by reference. It is

through the JLab EH&S Manual that subcontractors are required to meet NFPA 70E requirements.

Conclusions

JLab recognized the hazards associated with energized electrical work and is committed to compliance with NFPA 70E. This work has been proceeding well, but much work remains to fully implement the requirements of NFPA 70E.

The Laboratory has taken a commendable step in protecting its employees by curtailing Mode 3 work and requiring the Laboratory Director's approval if it is required. Work on energized electrical equipment has currently been limited to Mode 2 activities, and this work requires the approval of the cognizant Associate Director.

The SC Review Team makes the following recommendations:

- *Key JLab personnel responsible for developing and implementing NFPA 70E programs should receive formal training as a prerequisite to performing this task.*
- *JLab should document the analysis (shock and flash hazards) and results specified in NFPA 70E in Article 110.8 (B)(1) for Mode 2 work.*
- *The implementation of NFPA 70E should be managed as a project with milestones, schedules, and deliverables. The JLab "NFPA 70E Implementation/SLAC Accident Investigation Review and Action Plan" dated January 31, 2005, (Attachment A) should be implemented as a part of this project.*
- *The new EH&S Director should take ownership for JLab's full compliance with NFPA 70E.*
- *JLab's definition of a "qualified person" should be revised to meet NFPA 70E Article 110.6(D)(1).*
- *Laboratory management should establish a comprehensive set of required site training courses pertaining to the safe performance of energized electrical work by Laboratory and subcontractor employees.*
- *JLab should communicate to subcontractors that they have the authority to stop work for any work activities at this facility that they believe present an imminent safety hazard. Furthermore, JLab should review and, where necessary, revise subcontract requirements and Laboratory policies so that this same guidance is reflected.*
- *The HVAC subcontractor employees should be provided with the same level of training in NFPA 70E as JLab employees.*

- *JLab should review all subcontracts to ensure that workers potentially exposed to electrical hazards are provided with the same level of training in NFPA 70E as JLab employees.*

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Report

1. Purpose

The purpose of this review is to provide assistance to the Office of Science (SC) and SC Laboratories in the area of electrical safety. The review assessed the Laboratory systems and processes for handling electrical work with a focus on processes for conducting work while equipment is energized (electrical hot work).

2. Scope

This review concentrated on the planning and execution of work conducted on energized equipment at the Thomas Jefferson National Accelerator Facility (JLab). It included reviewing and evaluating the Laboratory's policies, processes, and procedures that plan and execute work on energized electrical equipment. The following topics were evaluated during the review:

- Process for working on energized electrical equipment.
- Implementation of the process for working on energized electrical equipment.
- Training program for Laboratory and subcontractors personnel.
- Flowdown of Department of Energy (DOE/JLab requirements to subcontractors.
- Methods used for oversight of work on energized electrical equipment.

3. Observations

3.1 Energized Electrical Work Program/Implementation

The requirements for electrical work are specified in the JLab Environment Health & Safety (EH&S) Manual. The following four chapters, considered key, were reviewed and served as a basis for the interviews of managers, supervisors, and workers:

- 6110 Standard Lockout/Tagout Procedure
- 6210 General Electrical Safety (*Describes the JLab Electrical Safety Program*)
- 6220 AC Electrical Power Distribution Safety (*Describes the responsibilities for and the restrictions placed on work involving AC line power distribution equipment*)
- 6230 Electronic Equipment Safety (*Describes the service restrictions for work on all electronic equipment*)

In addition, Standard Operating Procedures (SOPs), Operational Safety Procedures, and Electrical Service Work Permits, which are lower-tier documents to the EH&S Manual, were reviewed.

The standard that was used to evaluate the four chapters of the JLab EH&S Manual and the above-mentioned procedures was National Fire Protection Association (NFPA) 70E Standard for Electrical Safety in the Workplace, 2004 Edition.

The SC Review Team found that safety is foremost at all levels of the Laboratory. NFPA 70E has made initial inroads into JLab's safety culture as evidenced by the components and practices of the standard that have already been incorporated into both their EH&S Manual and procedures. Also, knowledge of its requirements was evident in the interviews with managers, supervisors, and workers.

The effort to achieve full adoption of NFPA 70E was started in response to an assessment made by JLab's Electrical Safety Improvement Team (ESIT), which was contained in a report issued on July 15, 2004. This report included a recommendation to "Update the Electrical Safety Manual and SOPs to include the latest NFPA 70E requirements."

The following illustrates the chronology of the implementation of NFPA 70E at JLab:

| | |
|-----------------|---|
| June 2003 | The current revision of the JLab Work Smart Standards Set reaffirms the current edition of NFPA 70E Electrical Safety Requirements for Employee Workplaces as a Sufficient External Standard. |
| April 2004 | Commenced computerized modeling of Accelerator Site Electrical Distribution System using SKM PowerTools software to determine the available incident energy and required Personal Protective Equipment (PPE) for work on various items of switchgear. |
| July 2004 | Flame retardant switching suits purchased and placed in use for all energized or potentially energized work on medium voltage switchgear including zero energy checks. |
| July 15, 2004 | Report of the JLAB ESIT recommends that JLAB update the Electrical Safety Chapters of the EH&S Manual and SOPs to include the latest NFPA 70E requirements and that JLab's HVAC workers should be trained to NFPA 70E and work to an SOP. |
| August 25, 2004 | Electrical Safety Subcommittee (ESS) discusses NFPA 70E and committee members are actioned to read an article, |

| | |
|-------------------|---|
| | “A Far Better 70E,” which discusses the improvements made in the 2004 edition of NFPA 70E. |
| October 11, 2004 | Electrical Arc Injury Occurs at Stanford Linear Accelerator Center (SLAC) |
| October 15, 2004 | ESS initiates correspondence with other laboratories in order to find out what the other labs are doing regarding training to NFPA 70E. |
| November 2004 | FR face shields, hard hats, V-rated gloves were purchased, included in kits assembled, and provided to Accelerator Division electrical workers along with training on their use. |
| November 3, 2004 | At the ESS meeting, it was mentioned that the JLab library had a copy of NFPA 70E available for review. The SLAC accident was mentioned under new business and discussion included an article on the accident from “Science” magazine dated October 29, 2004. |
| November 10, 2004 | At the Director’s Council Meeting, JLab management determined that work on electrical energized work [electrical hot work (Mode 3 work in JLab terms)] would require approval of the Laboratory Director to be performed. |
| November 12, 2004 | JLab issues an interim directive requiring the approval of the Laboratory Director for Mode 3 work. |
| December 2, 2004 | ESS unanimously accepts the use of NFPA 70E as the standard for electrical work at the laboratory. The ESS Chair is actioned to ask the JLab Environment Health and Safety Committee (JEHSC) to bring this to the Director’s Council for approval and Laboratory-wide implementation. |
| December 15, 2004 | SLAC Type A Accident Investigation Report Issued. |
| December 2004 | Interim Director of EH&S is assigned while a search is initiated for a permanent Director. |
| January 31, 2005 | NFPA 70E Implementation/SLAC Accident Investigation Review and Action Plan issued. |
| February 5, 2005 | EH&S Manual, Chapters 6220 & 6230, are revised to reflect Interim Operating Policy. Electrical Safety Work |

Permit is revised to match the Energized Electrical Work Permit in NFPA 70E (Appendix J).

The above chronology of events indicates that actions taken to include NFPA 70E in Laboratory operations were limited until the SLAC Accident.

Recommendation: Key JLab personnel responsible for developing and implementing NFPA 70E programs should receive formal training as a prerequisite to performing this task.

JLab provided the SC Review Team with their January 31, 2005, “NFPA 70E Implementation/SLAC Accident Investigation Review and Action Plan” (Attachment A) which identifies the following:

JLab will assess processes and procedures for compliance with NFPA 70E in the following areas:

- Training
- Qualifications
- Subcontractor Electrical Safety
- Electrical PPE
- Panel Labeling

JLab will develop a plan for required NFPA 70E hazard calculations for energized electrical work.

JLab will update EH&S Manual to include NFPA 70E.

The EHS Training Subcommittee will evaluate the need for dedicated NFPA 70E training for electrical workers. (During the February 9, 2005, ESS Meeting the Interim Safety Director stated that electrical workers will be trained to NFPA 70E compliance by an outside vendor.)

JLab will perform self-assessments of work management and work control including electrical work.

JLab will schedule an audit of the implementation of NFPA 70E.

In addition, JLab has issued interim instructions to address electrical safety issues that warrant immediate action. Examples:

JLab requires the Laboratory Director’s approval for all Mode 3 work. In the opening statement to the SC Review Team, the JLab Director indicated he envisioned no reason to conduct Mode 3 work.

NFPA 70E, Annex J, *Energized Electrical Work Permit*, is adopted. (This is particularly significant because this permit encompasses the major elements of NFPA 70E Article 130; e.g., shock hazard analysis and associated boundaries, flash hazard analysis and associated boundaries, identification of safe work practices, PPE, protective clothing, etc.)

There are elements of Mode 2 work; such as, diagnostics and zero voltage checks that expose the worker to energized circuits. To perform this work, NFPA 70E requires that all the steps in the Energized Work Permit be completed except for documentation. JLab is conducting the required hazard analysis calculations for Mode 2 work. However, recent JLab work control documents for Mode 2 work do not include the results of the hazard analysis calculations for required boundaries. Several recent work control documents did not include the approval signature of the cognizant Associate Director as required by the EH&S Manual Interim Appendixes.

Recommendation: JLab should document the analysis (shock and flash hazards) and results specified in NFPA 70E in Article 110.8 (B)(1) for Mode 2 work.

JLab has employed engineering controls to eliminate exposure to energized circuits during diagnostic and zero voltage checks. These include:

- Installation of external volt meters on power supply cabinets.
- Use of interlocks on cabinet doors and ground sticks to de-energize in the event cabinet doors are open or ground sticks are removed from clips.

It is the opinion of this SC Review Team that JLab is very serious about full implementation of NFPA 70E and has taken the steps necessary to accomplish this as is evident from the above planned actions. The SC Review Team also believes that JLab is pursuing full implementation as evidenced from the steps already taken including the issuance of interim instructions and the schedule they have chosen to complete the above mentioned planned actions.

Recommendation: The implementation of NFPA 70E should be managed as a project with milestones, schedules, and deliverables. The JLab “NFPA 70E Implementation/SLAC Accident Investigation Review and Action Plan” dated January 31, 2005, (see Attachment A) should be implemented as a part of this project.

The SC Review Team attempted to identify ownership of the implementation of NFPA 70E. It was not apparent that any one individual has this responsibility. Numerous individuals are performing various tasks toward implementing NFPA 70E, but this has led to inconsistencies with terminology interpretation and application.

Recommendation: The new EH&S Director should take ownership for JLab’s full compliance with NFPA 70E.

3.2 Energized Electrical Work Training

The need to train employees on the hazards associated with the performance of energized electrical work and the safety-related work practices established by NFPA 70E is understood by Laboratory line management. The Laboratory can achieve this training through multiple means. Training can be accomplished by combinations of informal on-the-job instruction, formal job/task-specific procedures, prepared classroom presentation, on-line instruction, and trades licensing.

Laboratory and subcontractor employees demonstrated an understanding of the most recent Laboratory management restrictions made to the Laboratory EH&S Manual for performing electrical work. In all line organizations, varying levels of employees understood the hazards they could potentially be exposed to while working on or near energized electrical conductors or circuits. Though interpretation of NFPA 70E requirements for the provision of some needed controls (the use of FR clothing and use of PPE while achieving an electrically safe work condition), were not fully understood at the supervisory/working level, these needed skills and knowledge are continuing to mature.

The Laboratory limits the performance of electrical work to only “qualified persons.” As defined in Laboratory procedures on electrical safety, a “qualified person” is someone recognized by Laboratory management as having sufficient understanding of a device or system to be able to positively identify and control the hazards it may present. This definition does not meet the NFPA 70E Article 110.6(D)(1) definition for a “qualified person.” The Laboratory stated their need to further define what makes a “qualified person” so as to provide line management with baseline expectations by which to sufficiently make these recognitions. This will ensure that those performing electrical work possess the needed skills and knowledge to recognize the associated hazards and implement the needed controls.

Recommendation: JLab’s definition of a “qualified person” should be revised to meet NFPA 70E Article 110.6(D)(1).

During late January 2005, a review was initiated through the Laboratory’s Office of Assessment to determine the status of current Laboratory and subcontractor training and qualification practices against the associated requirements of NFPA 70E. The conclusions are due to Laboratory management on February 15, 2005. Because of the recent start of this review, no information could be provided to the SC Review Team.

Individual employee training needs are established by supervisors by means of Individual Training Plans (ITPs). The Subcontracting Officer’s Technical Representative (SOTR) is responsible for establishing an ITP for each subcontractor employee working on site. An ITP contains the core training required for a particular position as well as those determined necessary by the supervisor. Each ITP is tracked electronically; and, when required courses are not completed or become overdue, electronic notification is made to the employee and the supervisor for the need to complete needed training. The catalog of Laboratory training courses shows several courses related to the performance of

energized electrical work. At the present time, the only Laboratory courses currently required to perform this type of work include *EH&S Orientation*, *CPR & AED*, and *Lock, Tag and Try*. Of the other courses in the training catalog, they have either not been developed or are not yet required. Therefore they can't or don't appear in any employee ITP, and as a consequence nobody has taken any of these courses. Laboratory management needs to first establish baseline requirements for a "qualified person" to ensure that Laboratory and subcontractor employees possess the needed skills and knowledge of the hazards and controls necessary for the safe performance of energized electrical work.

Recommendation: Laboratory management should establish a comprehensive set of required site training courses pertaining to the safe performance of energized electrical work by Laboratory and subcontractor employees.

3.3 Oversight

JLab has several oversight activities that review electrical energized work. The Laboratory established an ESIT to review a number of electrical safety matters in 2004. The ESIT was a group of Jefferson Lab, Harris Electric, and MRI electrical staffers. The ESIT prepared a report dated July 15, 2004. The report discusses the status of electrical safety issues, including the need to revise Laboratory EH&S Manuals and SOPs to include the latest NFPA 70E requirements. The report also contains a report to JLab by an independent electrical safety consultant dated June 24, 2004. The consultant's report is an appendix to the ESIT report and also contains a large number of suggested upgrades and improvements to the JLab electrical procedures.

JLab has reviewed all of the suggested upgrades / improvements and reported the status of this review to the SC Review Team. In the February status report, about half of the recommendations have been acted on and have resulted in upgrades to the electrical safety procedures in the JLab EH&S Manual. The remaining open items are forecasted to be completed over the next several months with the latest completion date estimated to be July 15, 2005. As a result, the SC Review Team is unable to fully assess JLab response to all the recommendations, but the SC Review Team found that JLab is seriously addressing the July 15, 2004, report.

The JLab Electrical SOTR indicated that he performs regular oversight of subcontractor performance. Electrical subcontractor personnel confirmed that this oversight function is performed.

Additionally, during the JLab orientation meeting with the SC Review Team, the JLab Director announced that he has established an EH&S function that reports to the Director and oversees all JLab divisions. The functions of this EH&S organization are being finalized, but it is clear that this EH&S group will play an important role of supporting line organizations in the successful implementation of NFPA 70E requirements.

All three of these oversight functions are contributing to achieving electrical safety when dealing with work on energized circuits. The SC Review Team is encouraged with the establishment of the new EH&S function reporting to the Director.

3.4 Subcontractor Requirements Flowdown

The JLab contract includes the requirement of NFPA 70E. The current edition is in the work smart standards (WSS) within the contract. The JLab EH&S Manual has recently been updated to include interim appendices to improve compliance with NFPA 70E requirements. The subcontract with Harris Electrical makes the JLab EH&S Manual a contract requirement.

The JLab EH&S Manual chapters on electrical safety are an important element because the subcontractor includes them in the required subcontract safety plan. The safety plan is submitted as part of the subcontract documentation and requires the approval of JLab. It serves as the overall direction to subcontractor personnel. The EH&S Manual chapters on electrical safety are undergoing a substantial rewrite in response to the lessons learned from the electrical accident at SLAC.

During interviews with JLab Electrical SOTR and electrical subcontractor, it was apparent that safety was an integral part of the work; however, the SC Review Team was concerned by a subcontractor's response that he did not have "Stop Work" authority. This individual indicated that any safety concerns would have to be communicated up through the SOTR, and it would be the SOTR's responsibility to determine if any action was warranted. After reviewing the available subcontractor work requirement documents and JLab's EH&S Manual chapter on Stop Work, as written, the Lab may impose Stop Work on a subcontractor; and subcontractors may impose Stop Work on their lower-tier subcontractors, but the converse is not evident. The JLab Electrical SOTR was knowledgeable of the subcontractor, and the subcontractor's journeyman electrician and his apprentice demonstrated their commitment to safety.

Recommendation: JLab should communicate to subcontractors that they have the authority to stop work for any work activities at this facility that they believe present an imminent safety hazard at the time of occurrence. Furthermore, JLab should review and, where necessary, revise subcontract requirements and Lab policies so that this same guidance is reflected.

The SC Review Team also interviewed a mechanic of MRI, an HVAC subcontractor of JLab. This subcontractor stated that no energized electrical work is currently being performed. The subcontractor went on to state that, at times, this creates a problem in troubleshooting systems. In discussions with JLab personnel, the SC Review Team was told that, at some time in the future, the HVAC subcontractor expects to be authorized to do diagnostics on energized equipment.

Recommendation: The HVAC subcontractor employees should be provided with the same level of training in NFPA 70E as JLab employees.

Recommendation: JLab should review all subcontracts to ensure that workers potentially exposed to electrical hazards are provided with the same level of training in NFPA 70E as JLab employees.

4. Conclusions

JLab recognizes the hazards associated with energized electrical work and is committed to compliance with NFPA 70E. The Lab has taken a commendable step in protecting its employees by curtailing Mode 3 work and requiring the Laboratory Director's approval if it is required. Work on energized electrical equipment has currently been limited to Mode 2 activities, and this work requires the approval of the cognizant Associate Director. This work has been proceeding well but much work remains to fully implement the requirements of NFPA 70E.

The SC Review Team makes the following recommendations:

- *Key JLab personnel responsible for developing and implementing NFPA 70E programs should receive formal training as prerequisite to performing this task.*
- *JLab should document the analysis (shock and flash hazards) and results specified in NFPA 70E in Article 110.8 (B)(1) for Mode 2 work.*
- *The implementation of NFPA 70E should be managed as a project with milestones, schedules, and deliverables. The JLab "NFPA 70E Implementation/SLAC Accident Investigation Review and Action Plan" dated January 31, 2005, (Attachment A) should be implemented as a part of this project.*
- *The new EH&S Director should take ownership for JLab's full compliance with NFPA 70E.*
- *JLab's definition of a "qualified person" should be revised to meet NFPA 70E Article 110.6(D)(1).*
- *Laboratory management should establish a comprehensive set of required site training courses pertaining to the safe performance of energized electrical work by Laboratory and subcontractor employees.*
- *JLab should communicate to subcontractors that they have the authority to stop work for any work activities at this facility that they believe present an imminent safety hazard at the time of occurrence. Furthermore, JLab should review and where necessary revise subcontract requirements and Lab policies so that this same guidance is reflected.*
- *The HVAC subcontractor employees should be provided with the same level of training in NFPA 70E as JLab employees.*
- *JLab should review all subcontracts to ensure that workers potentially exposed to electrical hazards are provided with the same level of training in NFPA 70E as JLab employees*

Attachment A

NFPA 70E Implementation/SLAC Accident Investigation Review and Action Plan

January 31, 2005

NFPA 70E Implementation/SLAC Accident Investigation Review and Action Plan

In Progress/Completed Actions:

1. SLAC Report forwarded to senior managers and safety personnel, made available on website and employees strongly encouraged to read. (Complete 1/20/05)
2. Brief SLAC Lessons Learned at Shutdown Safety Meeting (Complete 2/1/05)
3. Revise EHS Manual 6220, 6230 to reflect Interim Operating Policy. Upgrade Electrical Work Permit to match NFPA 70E. (Approved by Director's Council 2/2/05, Complete 2/4/05)
4. Safety Poster showing arc blast and highlighting SLAC Report key findings in preparation. (Target date 2/10/05)

Planned Actions:

1. Review SOP's with dates prior to Interim Policy to see if changes required for compliance. DSO's tasked - Complete by 2/4/05
2. Perform Self Assessments of JLab processes and procedures for compliance with NFPA70E in the following areas:
 - Training (OPA, ESIT report touched on this) Hugh Williams has started - due date 2/15/05.
 - Qualification (ESIT Report commented positively here)
 - Subcontractor Electrical Safety/Work Control Requirements Flowdown (Facilities) (Rusty Sprouse or John Kelly to have done).
 - Electrical PPE (PrSM Consultant, John Kelly looking into PPE training)
 - Required panel labeling.

Meet with the Electrical Safety Subcommittee 2/9/05 to determine their input with regard to priority, assessors, and due dates.

3. Develop a plan for required NFPA 70E hazard calculations for energized electrical work, including prioritized list of calculations, schedule of completion, and an estimate of resources required. Submit plan and recommendations to Director's Safety Council with recommendations regarding schedule and resources required to complete as well as a discussion of need/value of completing calculations in advance of work given the dramatic reduction in energized work. (Calculations in progress). Electrical Safety Subcommittee - March 30 target for plan. Brief to Director's Safety Council when ready.
4. Review EH&S Manual and update as required to ensure NFPA70E Electrical Safety Program requirements are all captured. DOE-SC visit results will give some idea of priority. Electrical Safety Subcommittee to be tasked - develop review plan by 2/18/05 with July 05 completion target. Develop phased schedule to include areas in Item 2. Develop overarching Electrical Safety Program description for inclusion in EH&S Manual and/or ISM Program Manual..

January 31, 2005

5. EHS Training Subcommittee evaluate need for dedicated NFPA70E training for electrical workers. Use Training assessment of item 2 above as partial input. Committee to provide recommendations by April 11, 2005. (Date is arbitrary - anticipates one month for EHS Training Subcommittee to review and report.
6. Perform Self Assessment of Work Management, including hazard analysis and control. The Comprehensive Safety Strategy requires an assessment of Work management and Work Control to be complete by April 30, 2005. Including electrical work in that overall assessment will satisfy this action.
7. Schedule NFPA 70E audit by outside expert (ESIT recommendation). Electrical Safety Subcommittee recommend audit target date and any potential auditors by March 15, 2005.

Attachment B

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